SPECIFICATION
FOR
APPROVAL

(◆) **Preliminary Specification**
( ) **Final Specification**

Title	11.6” FHD TFT LCD

Customer	
MODEL	

SUPPLIER	LG Display Co., Ltd.
*MODEL	LP116WF1
Suffix	SPA1-512

*When you obtain standard approval,
please use the above model name without suffix

APPROVED BY	SIGNATURE
/	
/	
/	

Please return 1 copy for your confirmation with your signature and comments.

APPROVED BY	SIGNATURE
Mighty Paeng / S. Manager	
REVIEWED BY	
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K. M. Lee / Engineer	

Products Engineering Dept.
LG Display Co., Ltd

Contents

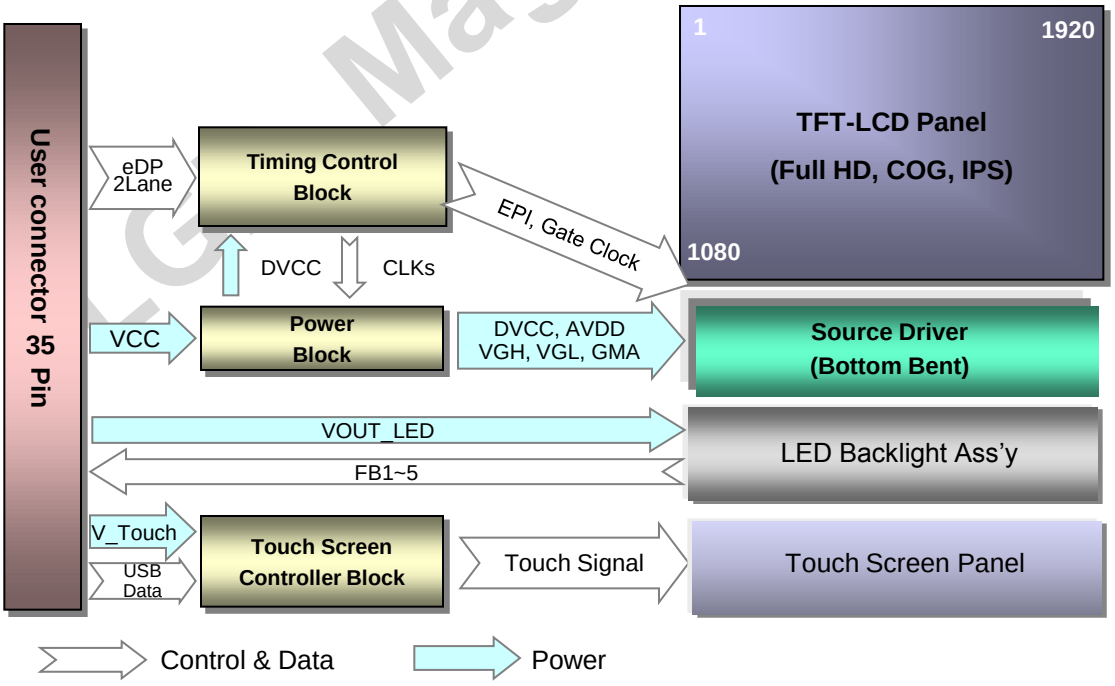
RECORD OF REVISIONS

Revision No	Revision Date	Page	Description	EDID Ver.
0.0	Mar. 15. 2012	-	First Draft	V0.0
0.1	May. 31. 2012	5	Update Sensor Active area size, Weight spec, Surface Treatment, Cover Glass type	V0.1
		7	Update Power Consumption	
		8	Change Initial → minimum	
		14	Update Cover Lens Type / Thickness	
		16	Update response time typ. spec	
		19	Update TSP Thickness spec	
		20	Update LCM+TSP Module drawing	
		23	Update Packing Form	
		24	Update Packing Assembly	
		25	Update Pallet Assembly	
0.2	June. 13. 2012	5	Update Outline Dimension	V0.2
		19	Update Outline Dimension	
0.3	July. 4. 2012	11	Update Timing Table	V0.3
0.4	July. 14. 2012	11	Update color spec	V0.4
0.5	Aug. 9. 2012	15	Add 'Check with Optimus Test before packing'	V0.5
0.6	Aug. 10. 2012	10	Differential peak-to-peak Input voltage at Test Points (Eye diagram height) : 120mV → 70mV For high bit rate	V0.6
		28-30	Update APPENDIX. EEDID	
0.7	Aug. 23. 2012	5	Update Glass Type	V0.7
		14	Update Power Consumption	
		15	Update Touch Inspection Process	
		19	Surface Treatment : AF Coating	

1. General Description

The LP116WF1 is a Color Active Matrix Liquid Crystal Display with an integral LED backlight system and Touch Screen Panel. The matrix employs a-Si Thin Film Transistor as the active element. It is a transmissive type display operating in the normally black mode. This TFT-LCD has 11.6 inches diagonally measured active display area with FHD resolution (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into Red, Green and Blue sub-pixels or dots which are arranged in vertical stripes. Gray scale or the brightness of the sub-pixel color is determined with a 6-bit gray scale signal for each dot, thus, presenting a palette of more than 262,144 colors. The LP116WF1 has been designed to apply the interface method that enables low power, high speed, low EMI. The LP116WF1 is intended to support applications where thin thickness, low power are critical factors and graphic displays are important. In combination with the vertical arrangement of the sub-pixels, the LP116WF1 characteristics provide an excellent flat display.

LP116WF1 is the 'Total solution' model. It means it includes LCM & TSP
(TSP is assembled by 'Direct Bonding' method)



General Features

LCM

Active Screen Size	11.6 inches diagonal	
Outline Dimension	LCM	267.0±0.5 (H) × 157.8±0.5 (V) × 2.5 mm (max.)
Pixel Pitch	0.1335 mm × 0.1335 mm	
Pixel Format	1920 horiz. by 1080 vert. Pixels RGB strip arrangement	
Color Depth	6-bit, 1262,144 colors	
Luminance, White	360cd/m^2(Typ., @I_{LED}=17mA)	
Power Consumption	Logic	0.95W (typ.@Mosaic)
	B/L	2.10W (typ.@ I_{LED}= 17mA)
Weight	LCM	185g (max.)
Display Operating Mode	Transmissive mode, normally Black	
Surface Treatment	Glare treatment of the front polarizer	

TSP

Active Screen Size	11.6 inches diagonal	
Cover Glass Outline Dimension	305(H) × 181.4(V) × 0.7 (D) mm (typ.)	
Sensor Film Outline Dimension	267(H) × 157.90(V) × 0.188 (D) mm (typ.)	
Sensor Active area	259.2(H) × 147.18(V) mm	
Cover View Area	257.72(H) × 145.58(V) mm	
Sensor Chanel Pitch	4.11mm (H) x 4.06mm (V), Grid	
Number of Sensor Chanel	36ea(H) x 64ea(V)	
Power Consumption	0.43W (typ. @ VTSP=3.3V)	
Weight	145g (max. w resin)	
Display Operating Mode	Transmissive mode, normally Black	
Surface Treatment	AF Coating(8H))	
Substrate	Type	Projected Capacitive Add-on Touch Sensor Film, GF2
	Input Method	Single & Multi Finger
Cover Glass	Gorilla2 0.7T	

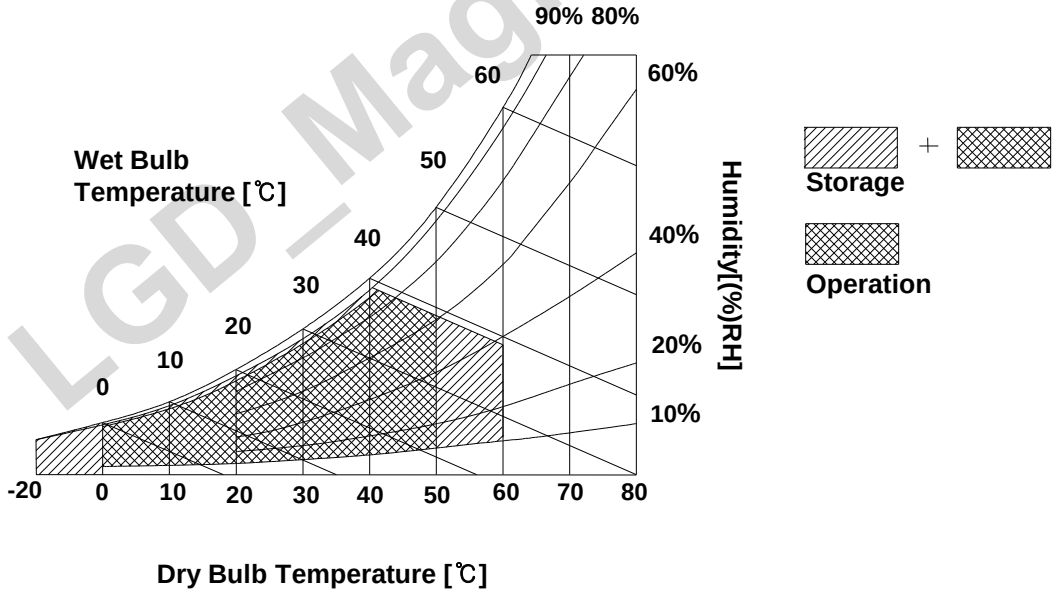
2. Absolute Maximum Ratings

The following are maximum values which, if exceeded, may cause faulty operation or damage to the unit.

Table 1. ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Values		Units	Notes
		Min	Max		
Power Input Voltage	VCC	-0.3	4.0	Vdc	at 25 ± 5°C
Operating Temperature	TOP	0	50	°C	1
Storage Temperature	HST	-20	60	°C	1
Operating Ambient Humidity	HOP	10	90	%RH	1
Storage Humidity	HST	10	90	%RH	1

Note : 1. Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39°C Max, and no condensation of water.



3. Electrical Specifications

3-1. Electrical Characteristics

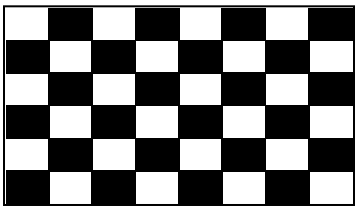
The LP116WF1 requires two power inputs. The first logic is employed to power the LCD electronics and to drive the TFT array and liquid crystal. The second backlight is the input about LED BL with LED Driver.

Table 2. ELECTRICAL CHARACTERISTICS

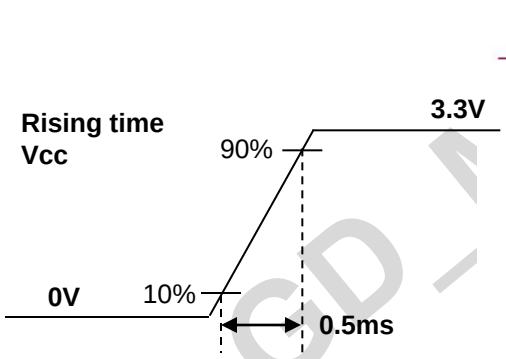
Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
LOGIC :						
Power Supply Input Voltage	V_{CC}	3.0	3.3	3.6	V	1
Power Supply Input Current	I_{CC}	-	290	330	mA	2
Power Consumption	P_{CC}	-	0.95	1.10	W	2
Power Supply Inrush Current	I_{CC_P}	-	-	1500	mA	3
LVDS Impedance	Z_{LVDS}	90	100	110	Ω	4
BACKLIGHT : (without LED Driver)						
LED Vf	V_f		2.85	2.9	V	
Operating Current per string	I_{LED}	-	17		mA	5
LED Power Consumption	P_{LED}	-	2.10	2.22	W	6
Life Time		15,000	-	-	Hrs	7
Touch Panel :						
Power Supply Input Voltage	V_{TSP}	3.0	3.3	3.6	V	
Power Supply Input Current	I_{TSP}		130	150	mA	8
Power Consumption	P_{TSP}		0.43	0.50	W	8

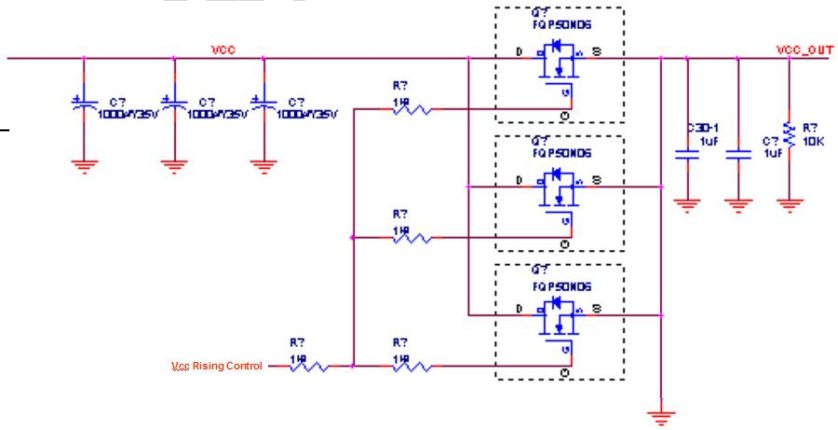
Note)

1. The measuring position is the connector of LCM and the test conditions are under 25℃, fv = 60Hz, White pattern.
2. The specified Icc current and power consumption are under the Vcc = 3.3V , 25℃, fv = 60Hz condition whereas Mosaic pattern is displayed and fv is the frame frequency.



3. The below figures are the measuring Vcc condition and the Vcc control block LGD used. The Vcc condition is same the minimum of T1 at Power on sequence.





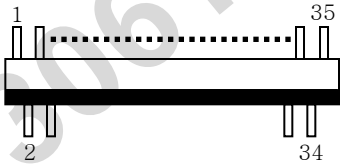
4. This impedance value is needed to proper display and measured form LVDS Tx to the mating connector.
5. The typical operating current is for the typical surface luminance (L_{WH}) in optical characteristics. I_{LED} is the current of each LEDs' string, LED backlight has strings on it.
6. The LED power consumption shown above does not include power of external LED driver circuit for typical current condition.
7. The life time is determined as the time at which the typical brightness of LCD is 50% compare to that of minimum value at the typical LED current. These LED backlight has 5 strings on it and the typical current of LED's string is base on 17mA.
8. The specified ITSP current and power consumption (PTSP) are under the VTSP = 5V , 25℃, 100Hz at 1-finger and Active mode.

3-2. Interface Connection

This LCD employs two interface connections, a 35pin connector is used for the module electronics interface and the other connector is used for the integral backlight system.

The electronics interface connector is a model FH35W-35S-0.3SHW manufactured by Hirose.

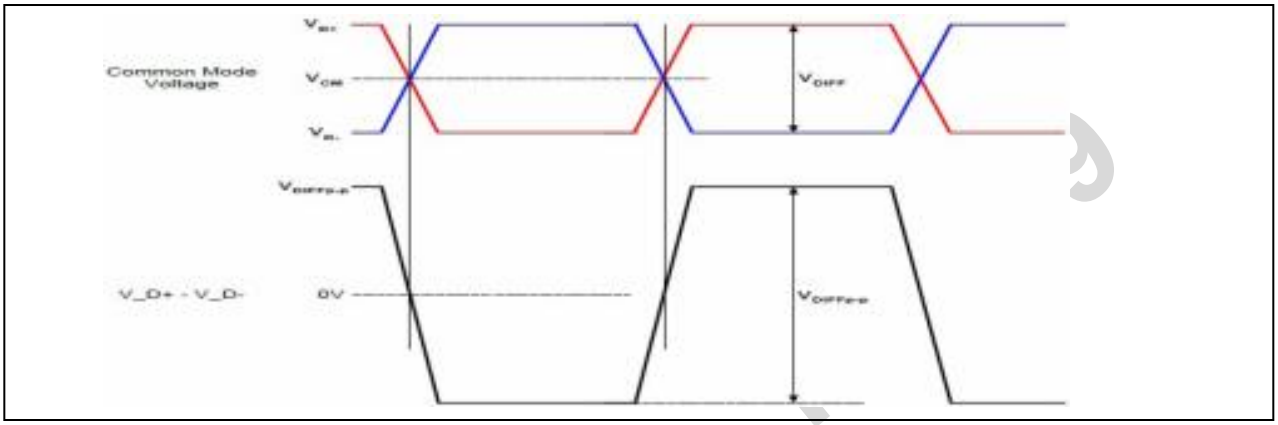
Table 3. MODULE CONNECTOR PIN CONFIGURATION (CN1)

Pin	Symbol	Description	Notes
1	NC	No Connection	**[Connector]** FH35W-35S-0.3SHW(Hirose), 35pin **[Connector pin arrangement]**  [LCD Module Rear View]
2	FB5	LED Cathode	
3	FB4	LED Cathode	
4	FB3	LED Cathode	
5	FB2	LED Cathode	
6	FB1	LED Cathode	
7	NC	No Connection [Reserved]	
8	NC	No Connection [Reserved]	
9	VLED	Power Supply for LED [Anode]	
10	VLED	Power Supply for LED [Anode]	
11	NC	No Connection	
12	H_GND	High Speed Main Link Ground	
13	AUX-	Complement Signal Auxiliary Ch.	
14	AUX+	True Signal Auxiliary Ch.	
15	H_GND	High Speed Main Link Ground	
16	ML0-	Complement Signal Link Lane 0	
17	ML0+	True Signal Link Lane 0	
18	H_GND	High Speed Main Link Ground	
19	ML1-	Complement Signal Link Lane 1	
20	ML1+	True Signal Link Lane 1	
21	H_GND	High Speed Main Link Ground	
22	VCC	Power Supply, 3.3V Typ.	
23	VCC	Power Supply, 3.3V Typ.	
24	VCC	Power Supply, 3.3V Typ.	
25	NC	No Connection [Reserved]	
26	HPD	HPD Signal Pin	
27	GND	Ground	
28	GND	Ground	
29	GND	Ground	
30	T_GND	Touch Ground	
31	D+	Positive USB Signal for Touch	
32	D-	Negative USB Signal for Touch	
33	T_GND	Touch Ground	
34	VCC_3V	Power Supply, 3V Typ.	
35	VCC_3V	Power Supply, 3V Typ.	

3-3. eDP Signal Timing Specifications

3-3-1. DC Specification

The VESA Display Port related AC specification is compliant with the VESA Display Port Standard v1.1a.



Description	Symbol	Min	Max	Unit	Notes
Differential peak-to-peak Input voltage at Test Points (Eye diagram height)	VDIFF p-p	70	-	mV	For high bit rate
		40	-		For reduced bit rate
Rx DC common mode voltage	VCM	0	2.0	V	-

3-3-2. AC Specification

The VESA Display Port related AC specification is compliant with the VESA Display Port Standard v1.1a.

Description	Symbol	Min	Typ	Max	Unit	Notes
Unit Interval for high bit rate (2.7Gbps/lane)	UI_High_Rate	-	370	-	ps	Range is nominal ±350ppm. DisplayPort Link Rx does not require local crystal for link clock generation
Unit Interval for high bit rate (1.62Gbps/lane)	UI_Low_Rate	-	617	-	ps	
Lane-to-Lane skew	V Rx-SKEW-INTER_PAIR	-	-	5200	ps	-
Lane intra-pair skew	V Rx-SKEW-INTRA_PAIR	-	-	100	ps	For high bit rate
		-	-	300	ps	For reduced bit rate

3-4. Signal Timing Specifications

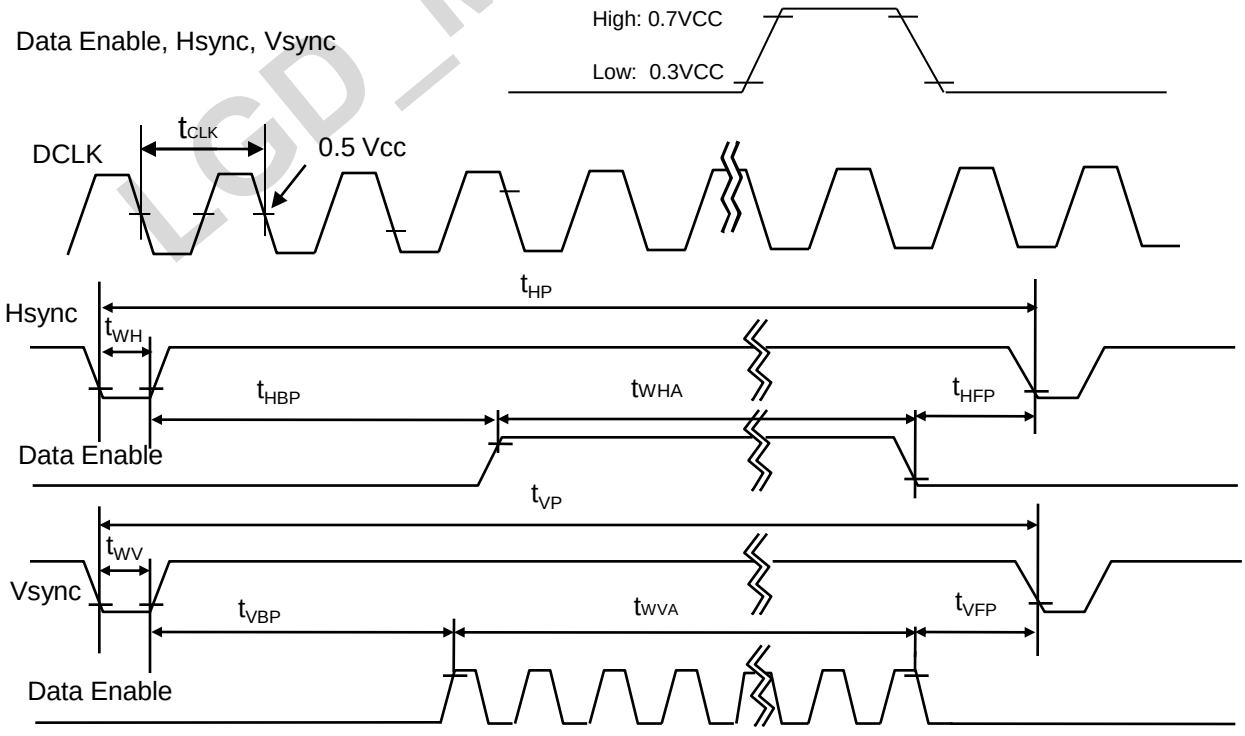
This is the signal timing required at the input of the User connector. All of the interface signal timing should be satisfied with the following specifications and specifications of eDP Tx/Rx for its proper operation.

Table 5. TIMING TABLE

ITEM	Symbol		Min	Typ	Max	Unit	Note
DCLK	Frequency	f_{CLK}	132.8	140	145.1	MHz	
Hsync	Period	T_{hp}	2020	2100	2156	tCLK	
	Width	t_{WH}	-	32	-		
	Width-Active	t_{WHA}	-	1920	-		
Vsync	Period	t_{VP}	1096	1111	1122	tHP	
	Width	t_{WV}	-	5	-		
	Width-Active	t_{WVA}	-	1080	-		
Data Enable	Horizontal back porch	t_{HBP}	48	100	100	tCLK	
	Horizontal front porch	t_{HFP}	20	48	104		
	Vertical back porch	t_{VBP}	10	23	28	tHP	
	Vertical front porch	t_{VFP}	1	3	9		

3-5. Signal Timing Waveforms

Condition : VCC =3.3V



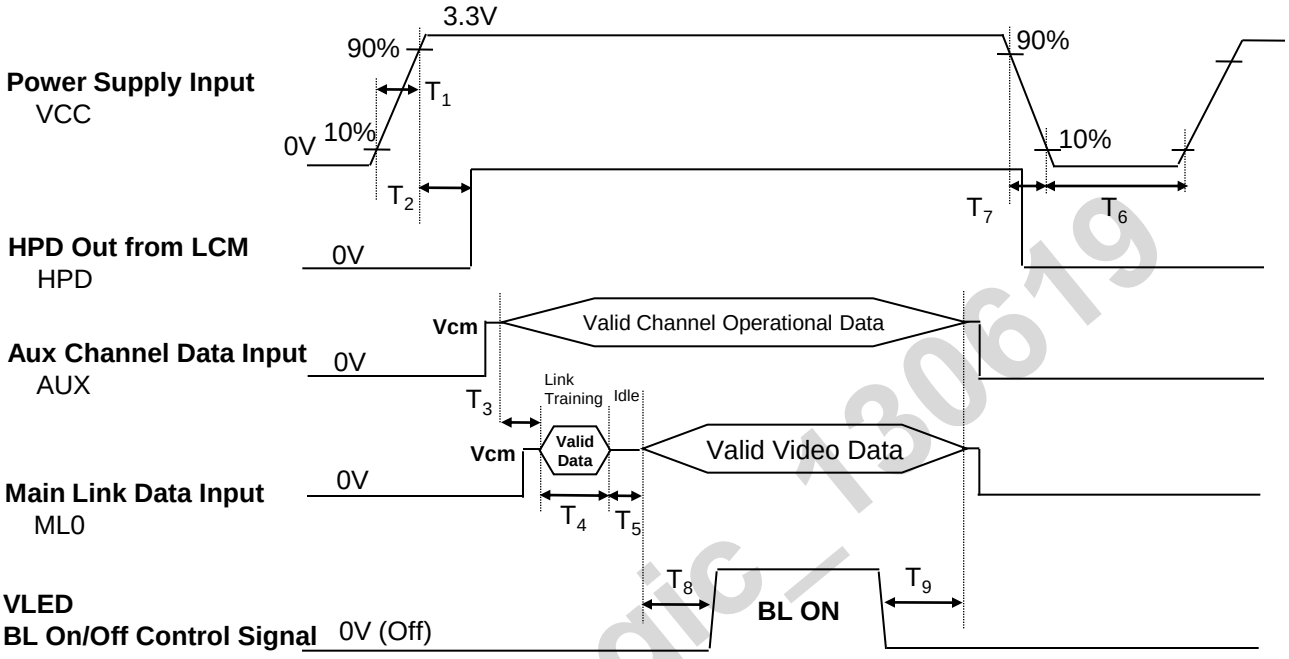
3-6. Color Input Data Reference

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color ; the higher the binary input, the brighter the color. The table below provides a reference for color versus data input.

Table 7. COLOR DATA REFERENCE

Color		Input Color Data																	
		RED						GREEN						BLUE					
		MSB					LSB	MSB					LSB	MSB					LSB
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (01)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	…			…						…						…			
	RED (62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (01)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	...			…						…						…			
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE (00)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (01)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	…			…						…						…			
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

3-7. Power Sequence



Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	200	ms
T3	50	75	-	ms
T4	0	-	-	ms
T5	0	-	-	ms
T6	500	-	-	ms
T7	3	-	10	ms
T8	200	-	-	ms
T9	200	-	-	ms

Note)
1. Do not insert the mating cable when system turn on.
2. Valid Data have to meet "3-3. eDP Signal Timing Specifications"
3. eDP need to pull-down condition on invalid status.
4. LGD recommend the rising sequence of VLED after the Vcc and valid status of eDP turn on.

4. Touch Specifications

4-1. General Specifications

The contents provide general characteristics for the model LP116WF1-SPA1.

Item			Spec.
General Specification	Multi touch points		10 points
	Active touch area		Same as LCD A/A
	Cover Lens	Outline	305 x 181.4 [mm]
		Type / Thickness	0.7 [mm]
	Sensor Film	Outline	267.0 x 157.9 [mm]
		Type / Thickness	GF2 / 0.2 [mm]
	Resolution		Same as LCD
	Interface		USB
	System OS		Win7/8
	Active Pen Support		Yes

4-2. Touch Performance

The contents provide general performance characteristics for the model LP116WF1-SPA1.

- Meet Win8 Requirement

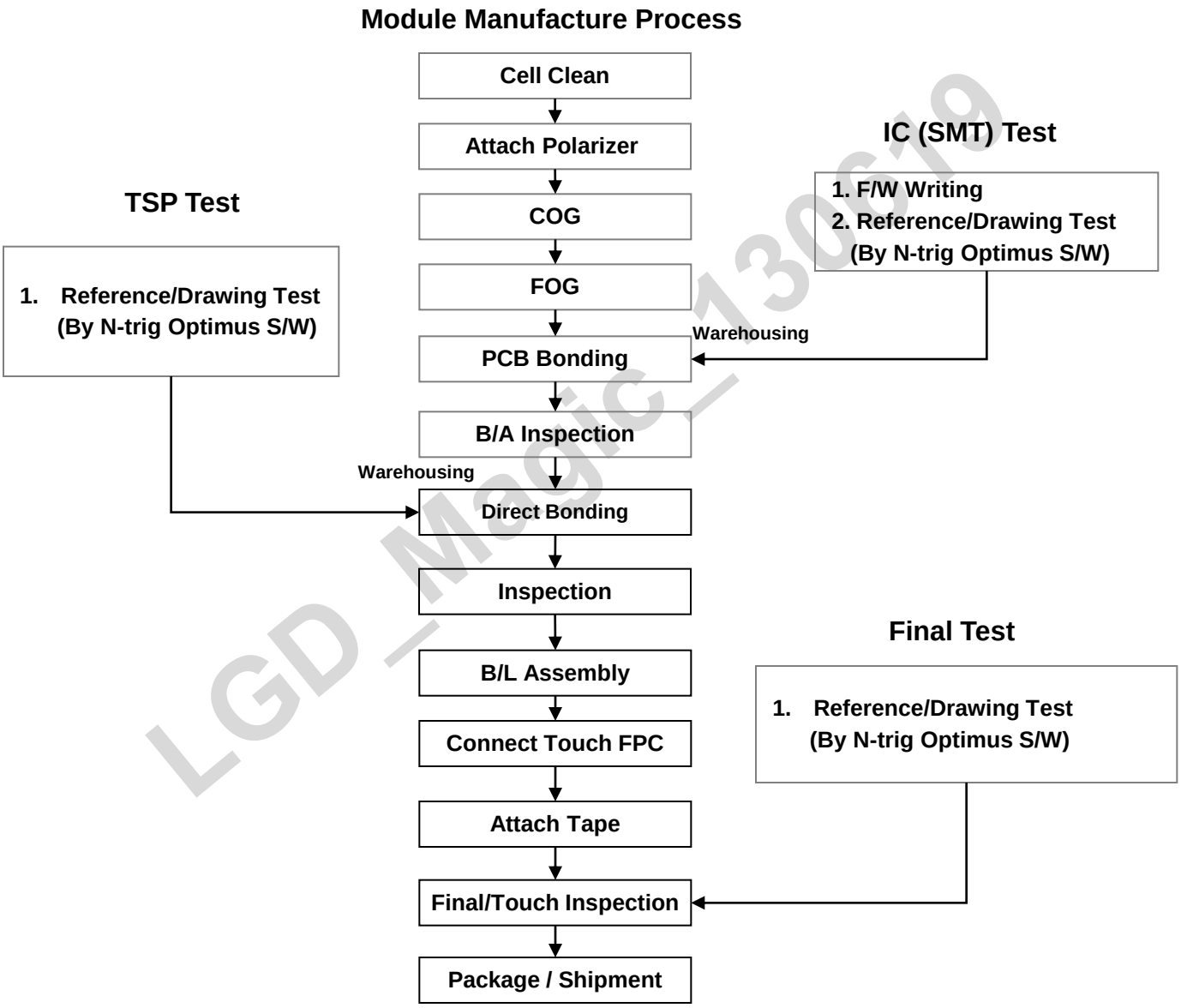
4-3. Touch Electrical Characteristics

The contents provide general Electrical characteristics for the model LP116WF1-SPA1.

Parameter	Symbol	Values			Units	Notes
		Min.	Typ.	Max.		
Power Supply Input Voltage	V_{TSP}	3.0	3.3	3.6	V	
Power Supply Input Current	I_{TSP}		130	150	mA	
Power Consumption	P_{TSP}		0.43	0.50	W	@ All Point Touch

4-4. Touch Inspection Process

The Touch Inspection will follow the process below.



5. Optical Specification

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the LCD surface at a viewing angle of Φ and Θ equal to 0°.
FIG. 1 presents additional information concerning the measurement equipment and method.

FIG. 1 Optical Characteristic Measurement Equipment and Method

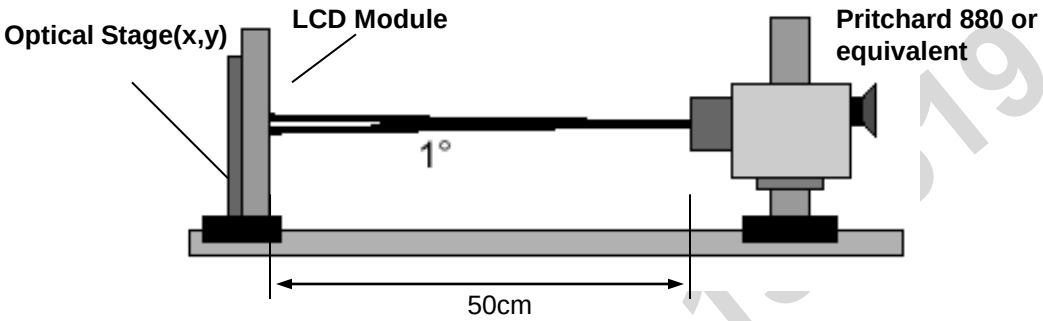


Table 8. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, fv=60Hz, I_{BL} = 17 mA

Parameter		Symbol	Values			Units	Notes
			Min	Typ	Max		
Contrast Ratio		CR	500	600	-		1
Surface Luminance (White)	w/Touch	L_{WH}	300	360	-	cd/m²	2
Luminance Variation		δ_{WHITE}	-	1.4	1.6		3
Response Time		$Tr_R + Tr_D$	-	25	40	ms	4
Color Coordinates							
	RED	RX	0.580	0.610	0.640		
		RY	0.320	0.350	0.380		
	GREEN	GX	0.295	0.325	0.355		
		GY	0.530	0.560	0.590		
	BLUE	BX	0.120	0.150	0.180		
		BY	0.100	0.130	0.160		
	WHITE	WX	0.283	0.313	0.343		
		WY	0.299	0.329	0.359		
Viewing Angle							5
	x axis, right(Φ=0°)	Θr	80			degree	3 o'clock
	x axis, left (Φ=180°)	Θl	80			degree	9 o'clock
	y axis, up (Φ=90°)	Θu	80			degree	12 o'clock
	y axis, down (Φ=270°)	Θd	80			degree	6 o'clock
Gray Scale				2.2			6

Note)

1. Contrast Ratio(CR) is defined mathematically as

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the average of 5 point across the LCD surface 50cm from the surface with all pixels displaying white. For more information see FIG 1.

$$L_{WH} = \text{Average}(L_1, L_2, \ldots L_5)$$

3. The variation in surface luminance , The panel total variation (δ_{WHITE}) is determined by measuring L_N at each test position 1 through 13 and then defined as followed numerical formula. For more information see FIG 2.

$$\delta_{WHITE} = \frac{\text{Maximum}(L_1, L_2, \ldots L_{13})}{\text{Minimum}(L_1, L_2, \ldots L_{13})}$$

4. Response time is the time required for the display to transition from white to black (rise time, Tr_R) and from black to white(Decay Time, Tr_D). For additional information see FIG 3.

5. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.

6. Gray scale specification

* f_V = 60Hz

Gray Level	Luminance [%] (Typ)
L0	0.1
L15	0.18
L31	0.68
L47	1.98
L63	4.36
L79	8.1
L95	12.93
L111	18.74
L127	25.3
L143	32.7
L159	40.67
L175	49.03
L191	58.08
L207	67.3
L223	77.7
L239	89.63
L255	100

FIG. 2 Luminance

<measuring point for surface luminance & measuring point for luminance variation>

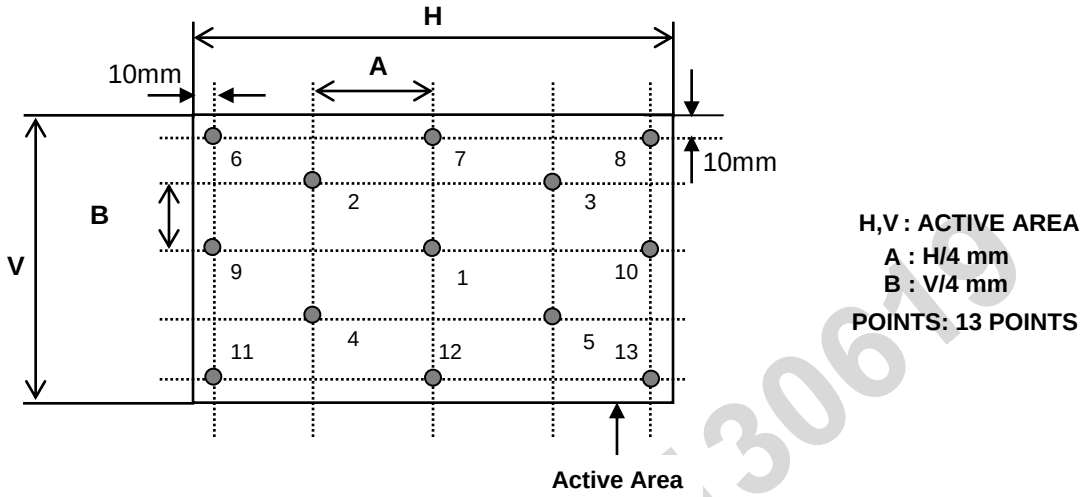


FIG. 3 Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

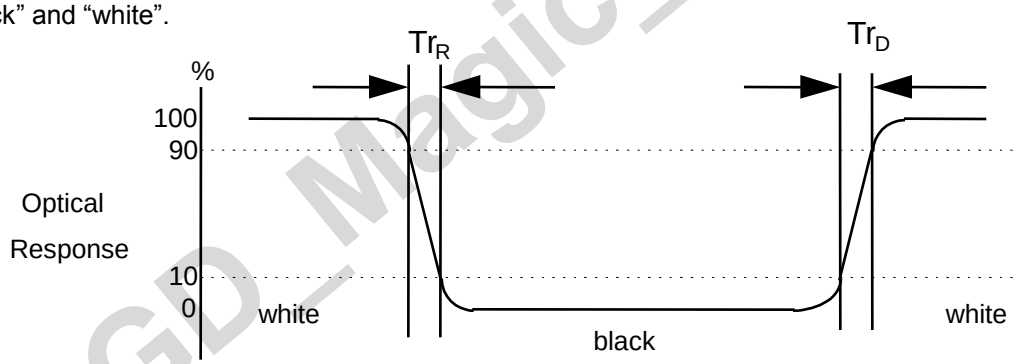
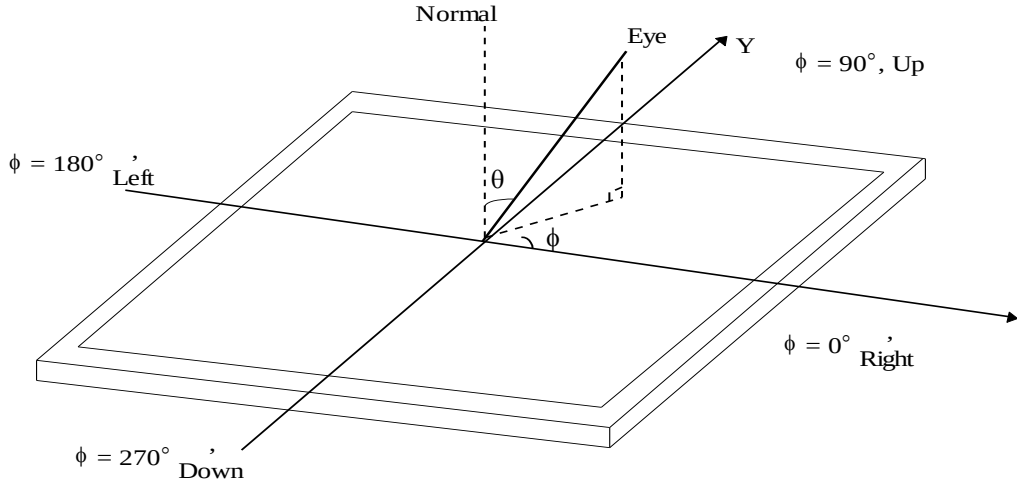


FIG. 4 Viewing angle



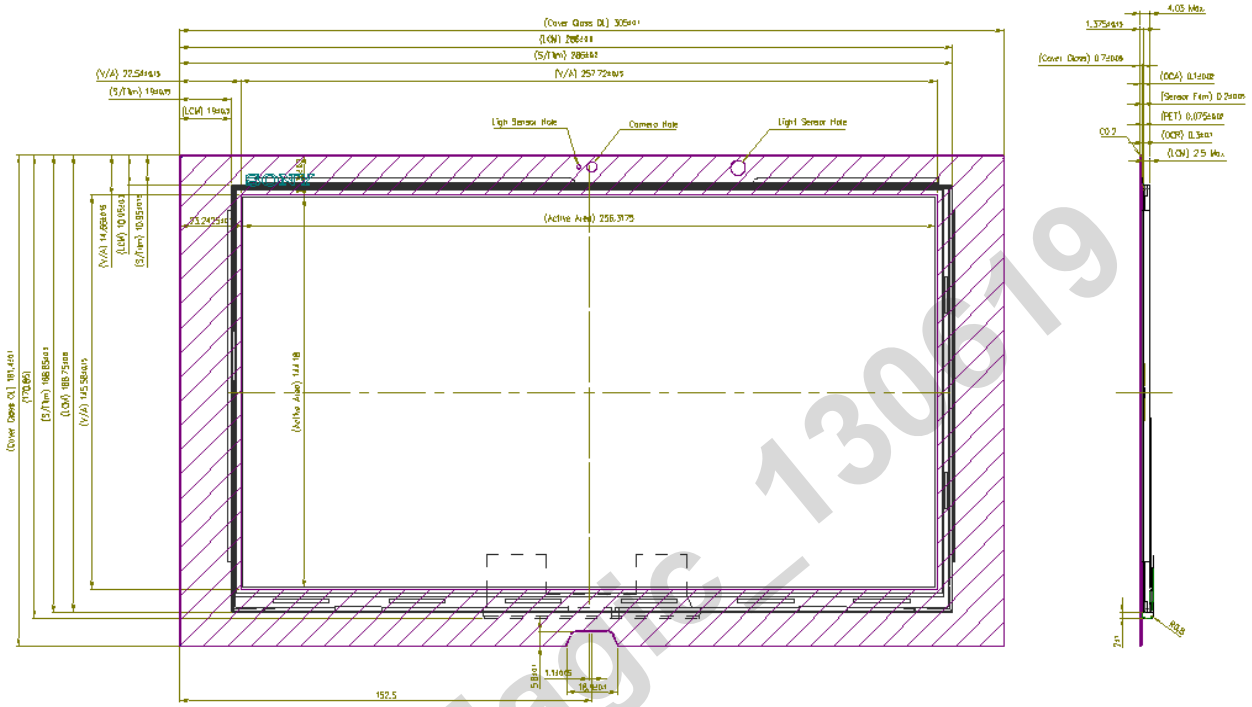
6. Mechanical Characteristics

The contents provide general mechanical characteristics for the model LP116WF1. In addition the figures in the next page are detailed mechanical drawing of the LCD.

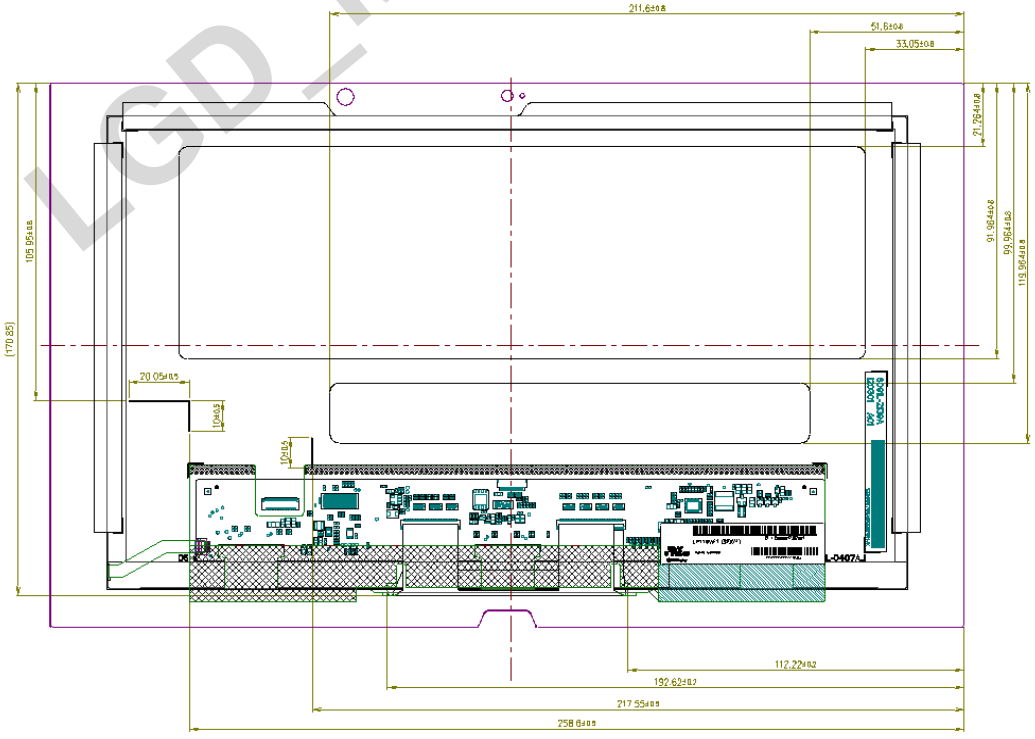
Outline Dimension	Horizontal	267.0 ± 0.5mm
	Vertical	157.8± 0.5mm
	Thickness	2.5mm (max), 4.5mm(w. PCB)
Active Display Area	Horizontal	256.320 ± 0.3mm
	Vertical	144.180 ± 0.3mm
Touch Screen Panel	Horizontal	305.0 ± 0.1mm
	Vertical	181.40 ± 0.1mm
	Thickness	1.53mm (max. w Resin)
Bezel Area	Horizontal	257.72 ± 0.15mm
	Vertical	145.58 ± 0.15mm
Weight	330g(Max) w/Touch, 185g(Max.) w/o Touch	
Surface Treatment	LCD : Glare treatment of the front polarizer TSP : AF Coating	
Viewing Angle	Viewing Angle (When Active area can be seen) ≤ 30°	

<FRONT VIEW_LCM+TSP Module>

Note) Unit:[mm], General tolerance: ± 0.5mm



<REAR VIEW_LCM+TSP Module>



7. Reliability

Environment test condition

No.	Test Item	Conditions
1	High temperature storage test	Ta= 60°C, 240h
2	Low temperature storage test	Ta= -20°C, 240h
3	High temperature operation test	Ta= 50°C, 50%RH, 240h
4	Low temperature operation test	Ta= 0°C, 240h
5	Vibration test (non-operating)	Random, 1.0Grms, X,Y,Z Direction Test time : each direction 1hour
6	Shock test (non-operating)	Half sine wave, 180G, 2ms one shock of each six faces
7	Altitude operating storage / shipment	0 ~ 10,000 feet (3,048m) 24Hr 0 ~ 40,000 feet (12,192m) 24Hr

{ Result Evaluation Criteria }
There should be no change which might affect the practical display function when the display quality test is conducted under normal operating condition.

8. International Standards

8-1. Safety

a) UL 60950-1, Underwriters Laboratories Inc.
Information Technology Equipment - Safety - Part 1 : General Requirements.

b) CAN/CSA C22.2 No.60950-1-07, Canadian Standards Association.
Information Technology Equipment - Safety - Part 1 : General Requirements.

c) EN 60950-1, European Committee for Electrotechnical Standardization (CENELEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

d) IEC 60950-1, The International Electrotechnical Commission (IEC).
Information Technology Equipment - Safety - Part 1 : General Requirements.

8-2. EMC

a) ANSI C63.4 “American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.” American National Standards Institute (ANSI), 2003.

b) CISPR 22 “Information technology equipment – Radio disturbance characteristics – Limit and methods of measurement." International Special Committee on Radio Interference (CISPR), 2005.

c) CISPR 13 “Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and method of measurement." International Special Committee on Radio Interference (CISPR), 2006.

8-3. Environment

a) RoHS, Directive 2002/95/EC of the European Parliament and of the council of 27 January 2003

9. Packing

9-1. Designation of Lot Mark

a) Lot Mark

A	B	C	D	E	F	G	H	I	J	K	L	M

A,B,C : SIZE(INCH)
D : YEAR
E : MONTH
F ~ M : SERIAL NO.

Note

1. YEAR

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Mark	A	B	C	D	E	F	G	H	J	K

2. MONTH

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mark	1	2	3	4	5	6	7	8	9	A	B	C

b) Location of Lot Mark

Serial No. is printed on the label. The label is attached to the backside of the LCD module.
This is subject to change without prior notice.

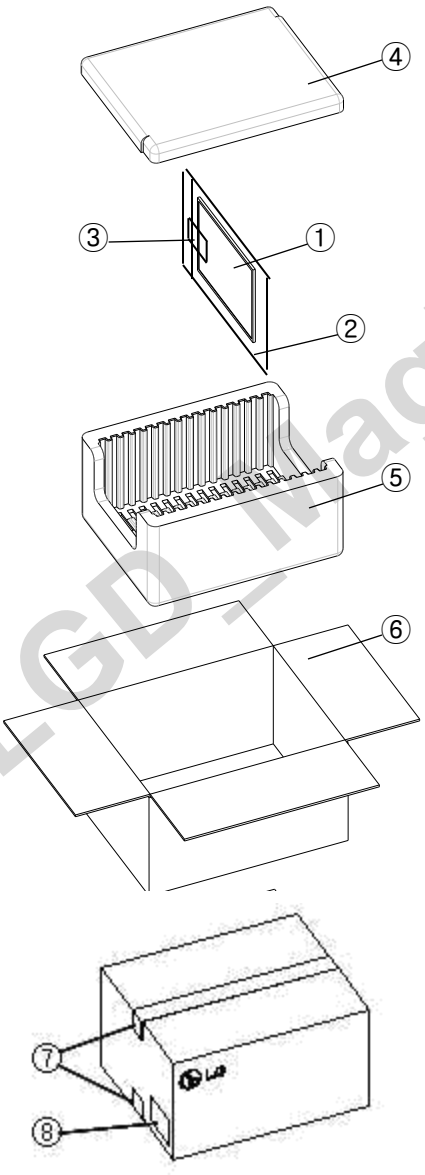
9-2. Packing Form

a) Package quantity in one box : 20 pcs

b) Box Size : 478*365*244

APPENDIX-2

■ Packing Assembly



1 LCM / 1 Bag

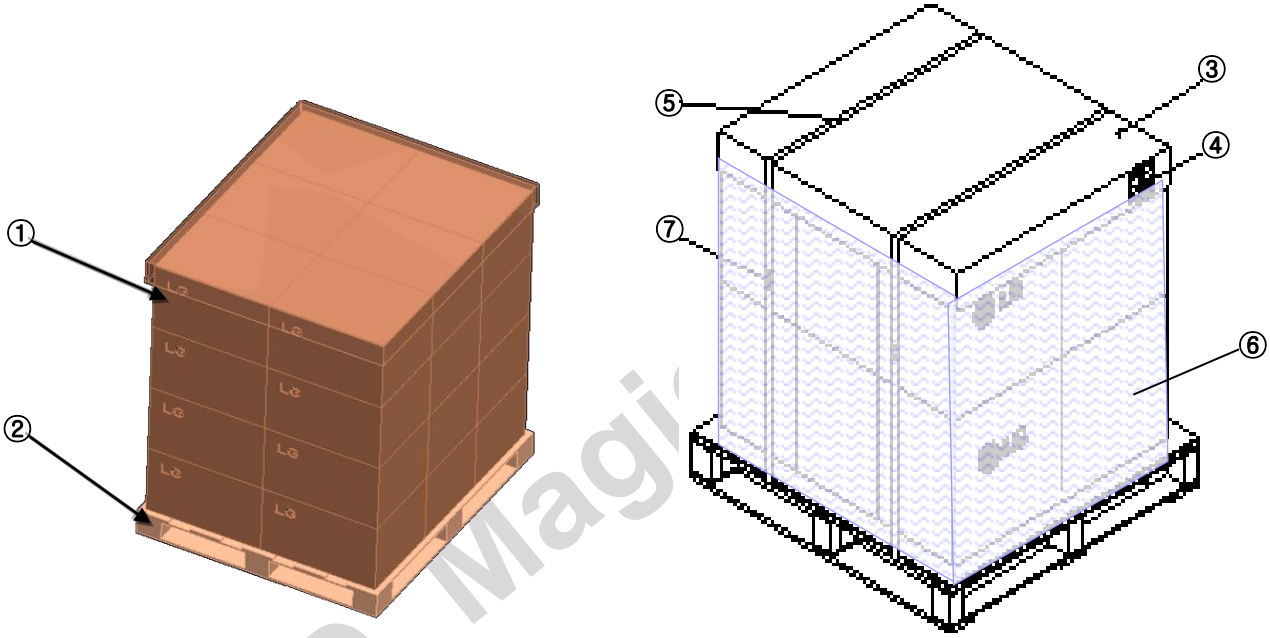
1 LCM / 1 Slot

20LCM/Box = 20 Slot

NO.	DESCRIPTION	MATERIAL
1	LCD Module	
2	BAG	AL
3	TAPE	MASKING 20MMX50M
4	PACKING, TOP	EPS
5	PACKING, BOTTOM	EPS
6	BOX	SWR4
7	TAPE	OPP 70MMX300M
8	LABEL	ART 100X70

APPENDIX-3

■ Pallet Assembly



NO.	DESCRIPTION	MATERIAL
1	Packing AssY	
2	Pallet	Plywood
3	Angle Cover	SWR4
4	Label	ART 100X70
5	Band	PP
6	Wrap	LLDPE
7	CLIP	Steel

10. PRECAUTIONS

Please pay attention to the followings when you use this TFT LCD module.

10-1. MOUNTING PRECAUTIONS

(1) You must mount a module using holes arranged in four corners or four sides.
(2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
(3) Please attach the surface transparent protective plate to the surface in order to protect the polarizer. Transparent protective plate should have sufficient strength in order to the resist external force.
(4) You should adopt radiation structure to satisfy the temperature specification.
(5) Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
(6) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
Do not touch the surface of polarizer for bare hand or greasy cloth.(Some cosmetics are detrimental to the polarizer.)
(7) When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzene. Normal-hexane is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene and alcohol because they cause chemical damage to the polarizer.
(8) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
(9) Do not open the case because inside circuits do not have sufficient strength.

10-2. OPERATING PRECAUTIONS

(1) The spike noise causes the mis-operation of circuits. It should be lower than following voltage :
V=± 200mV(Over and under shoot voltage)

(2) Response time depends on the temperature.(In lower temperature, it becomes longer.)
(3) Brightness depends on the temperature. (In lower temperature, it becomes lower.)
And in lower temperature, response time(required time that brightness is stable after turned on) becomes longer.
(4) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
(5) When fixed patterns are displayed for a long time, remnant image is likely to occur.
(6) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

10-3. ELECTROSTATIC DISCHARGE CONTROL

Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

10-4. PRECAUTIONS FOR STRONG LIGHT EXPOSURE

Strong light exposure causes degradation of polarizer and color filter.

10-5. STORAGE

When storing modules as spares for a long time, the following precautions are necessary.

(1) Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.
(2) The polarizer surface should not come in contact with any other object.
It is recommended that they be stored in the container in which they were shipped.

10-6. HANDLING PRECAUTIONS FOR PROTECTION FILM

(1) When the protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.
(2) The protection film is attached to the polarizer with a small amount of glue. If some stress is applied to rub the protection film against the polarizer during the time you peel off the film, the glue is apt to remain on the polarizer.
Please carefully peel off the protection film without rubbing it against the polarizer.
(3) When the module with protection film attached is stored for a long time, sometimes there remains a very small amount of glue still on the polarizer after the protection film is peeled off.
(4) You can remove the glue easily. When the glue remains on the polarizer surface or its vestige is recognized, please wipe them off with absorbent cotton waste or other soft material like chamois soaked with normal-hexane.

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 1/3

EDID Data for Google _ ver. 1.0

2012/7/7

	Byte (Dec)	Byte (Hex)	Field Name and Comments	Value (Hex)	Value (Bin)
Header	0	00	Header	00	00000000
	1	01	Header	FF	11111111
	2	02	Header	FF	11111111
	3	03	Header	FF	11111111
	4	04	Header	FF	11111111
	5	05	Header	FF	11111111
	6	06	Header	FF	11111111
	7	07	Header	00	00000000
Vendor / Product EDID Version	8	08	ID Manufacture Name LGD	30	00110000
	9	09	ID Manufacture Name	E4	11100100
	10	0A	ID Product Code 038Dh	8D	10001101
	11	0B	(Hex. LSB first)	03	00000011
	12	0C	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	13	0D	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	14	0E	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	15	0F	ID Serial No. - Optional ("00h" If not used, Number Only and LSB First)	00	00000000
	16	10	Week of Manufacture - Optinal 00 weeks	00	00000000
	17	11	Year of Manufacture 2012 years	16	00010110
	18	12	EDID structure version # = 1	01	00000001
	19	13	EDID revision # = 4	04	00000100
Display Parameters	20	14	Video input Definition = Input is a Digital Video signal Interface , Colo Bit Depth : 6 Bits per Primary Color , Digital Video Interface Standard Supported: DisplayPort is supported	95	10010101
	21	15	Horizontal Screen Size (Rounded cm) = 26 cm	1A	00011010
	22	16	Vertical Screen Size (Rounded cm) = 14 cm	0E	00001110
	23	17	Display Transfer Characteristic (Gamma) = (gamma*100)-100 = Example:(2.2*100)-100=120	78	01111000
	24	18	Feature Support [Display Power Management(DPM) : Standby Mode is not supported, Suspend Mode is not supported, Active Off = Very Low Power is not supported ,Supportted Color Encoding Formats : RGB 4:4:4 & YCrCb 4:4:4 ,Other Feature Support Flags : No_sRGB, Preferred Timing Mode, No_Display is continuous frequency (Multi-mode_Base EDID and Extension Block).]	0A	00001010
Panel Color Coordinates	25	19	Red/Green Low Bits (RxRy/GxGy)	28	00101000
	26	1A	Blue/White Low Bits (BxBy/WxWy)	C5	11000101
	27	1B	Red X Rx = 0.605	9B	10011011
	28	1C	Red Y Ry = 0.350	59	01011001
	29	1D	Green X Gx = 0.330	54	01010100
	30	1E	Green Y Gy = 0.570	92	10010010
	31	1F	Blue X Bx = 0.155	27	00100111
	32	20	Blue Y By = 0.125	20	00100000
	33	21	White X Wx = 0.313	50	01010000
	34	22	White Y Wy = 0.329	54	01010100
Established Timings	35	23	Established timing 1 (Optional_00h if not used)	00	00000000
	36	24	Established timing 2 (Optional_00h if not used)	00	00000000
	37	25	Manufacturer's timings (Optional_00h if not used)	00	00000000
Standard Timing ID	38	26	Standard timing ID1 (Optional_01h if not used)	01	00000001
	39	27	Standard timing ID1 (Optional_01h if not used)	01	00000001
	40	28	Standard timing ID2 (Optional_01h if not used)	01	00000001
	41	29	Standard timing ID2 (Optional_01h if not used)	01	00000001
	42	2A	Standard timing ID3 (Optional_01h if not used)	01	00000001
	43	2B	Standard timing ID3 (Optional_01h if not used)	01	00000001
	44	2C	Standard timing ID4 (Optional_01h if not used)	01	00000001
	45	2D	Standard timing ID4 (Optional_01h if not used)	01	00000001
	46	2E	Standard timing ID5 (Optional_01h if not used)	01	00000001
	47	2F	Standard timing ID5 (Optional_01h if not used)	01	00000001
	48	30	Standard timing ID6 (Optional_01h if not used)	01	00000001
	49	31	Standard timing ID6 (Optional_01h if not used)	01	00000001
	50	32	Standard timing ID7 (Optional_01h if not used)	01	00000001
	51	33	Standard timing ID7 (Optional_01h if not used)	01	00000001
	52	34	Standard timing ID8 (Optional_01h if not used)	01	00000001
	53	35	Standard timing ID8 (Optional_01h if not used)	01	00000001

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 2/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments		Value (Hex)	Value (Bin)
Timing Descriptor #1	54	36	Pixel Clock/10,000 (LSB)	140 MHz @ 60 Hz	B0	10110000
	55	37	Pixel Clock/10,000 (MSB)		36	00110110
	56	38	Horizontal Active (HA) (lower 8 bits)	1920 pixels	80	10000000
	57	39	Horizontal Blanking (HB) (lower 8 bits)	180 pixels	B4	10110100
	58	3A	Horizontal Active (HA) / Horizontal Blanking (HB) (upper 4:4bits)		70	01110000
	59	3B	Vertical Avtive (VA)	1080 lines	38	00111000
	60	3C	Vertical Blanking (VB) (DE Blanking typ.for DE only panels)	31 lines	1F	00011111
	61	3D	Vertical Active (VA) / Vertical Blanking (VB) (upper 4:4bits)		40	01000000
	62	3E	Horizontal Front Porch in pixels (HF) (lower 8 bits)	48 pixels	30	00110000
	63	3F	Horizontal Sync Pulse Width in pixels (HS) (lower 8 bits)	32 pixels	20	00100000
	64	40	Vertical Front Porch in lines (VF) : Vertical Sync Pluse Width in lines (VS) (lower 4 bits)	3 lines : 5 lines	35	00110101
	65	41	Horizontal Front Porch/ Sync Pulse Width/ Vertical Front Porch/ Sync Pulse Width (upper 2bits)		00	00000000
	66	42	Horizontal Vedio Image Size (mm) (lower 8 bits)	256 mm	00	00000000
	67	43	Vertical Vedio Image Size (mm) (lower 8 bits)	144 mm	90	10010000
	68	44	Horizontal Image Size / Vertical Image Size (upper 4 bits)		10	00010000
	69	45	Horizontal Border = 0 (Zero for Notebook LCD)		00	00000000
	70	46	Vertical Border = 0 (Zero for Notebook LCD)		00	00000000
	71	47	Non-Interlace, Normal display, no stereo, Digital Separate [Vsync_NEG, Hsync_POS (outside of V-sync)]		1B	00011011
Timing Descriptor #2	72	48	Pixel Clock/10,000 (LSB)	92 MHz @ 40 Hz	F0	11110000
	73	49	Pixel Clock/10,000 (MSB)		23	00100011
	74	4A	Horizontal Active (HA) (lower 8 bits)	1920 pixels	80	10000000
	75	4B	Horizontal Blanking (HB) (lower 8 bits)	160 pixels	A0	10100000
	76	4C	Horizontal Active (HA) / Horizontal Blanking (HB) (upper 4:4bits)		70	01110000
	77	4D	Vertical Avtive (VA)	1080 lines	38	00111000
	78	4E	Vertical Blanking (VB) (DE Blanking typ.for DE only panels)	26 lines	1A	00011010
	79	4F	Vertical Active (VA) / Vertical Blanking (VB) (upper 4:4bits)		40	01000000
	80	50	Horizontal Front Porch in pixels (HF) (lower 8 bits)	48 pixels	30	00110000
	81	51	Horizontal Sync Pulse Width in pixels (HS) (lower 8 bits)	32 pixels	20	00100000
	82	52	Vertical Front Porch in lines (VF) : Vertical Sync Pluse Width in lines (VS) (lower 4 bits)	3 lines : 5 lines	35	00110101
	83	53	Horizontal Front Porch/ Sync Pulse Width/ Vertical Front Porch/ Sync Pulse Width (upper 2bits)		00	00000000
	84	54	Horizontal Vedio Image Size (mm) (lower 8 bits)	256 mm	00	00000000
	85	55	Vertical Vedio Image Size (mm) (lower 8 bits)	144 mm	90	10010000
	86	56	Horizontal Image Size / Vertical Image Size (upper 4 bits)		10	00010000
	87	57	Horizontal Border = 0 (Zero for Notebook LCD)		00	00000000
	88	58	Vertical Border = 0 (Zero for Notebook LCD)		00	00000000
	89	59	Non-Interlace, Normal display, no stereo, Digital Separate [Vsync_NEG, Hsync_POS (outside of V-sync)]		1B	00011011
Timing Descriptor #3	90	5A	Flag		00	00000000
	91	5B	Flag		00	00000000
	92	5C	Flag		00	00000000
	93	5D	Data Type Tag (Alphanumeric Data String (ASCII String))		FE	11111110
	94	5E	Flag		00	00000000
	95	5F	Alphanumeric Data String (ASCII String)	L	4C	01001100
	96	60	Alphanumeric Data String (ASCII String)	G	47	01000111
	97	61	Alphanumeric Data String (ASCII String)		20	00100000
	98	62	Alphanumeric Data String (ASCII String)	D	44	01000100
	99	63	Alphanumeric Data String (ASCII String)	i	69	01101001
	100	64	Alphanumeric Data String (ASCII String)	s	73	01110011
	101	65	Alphanumeric Data String (ASCII String)	p	70	01110000
	102	66	Alphanumeric Data String (ASCII String)	l	6C	01101100
	103	67	Alphanumeric Data String (ASCII String)	a	61	01100001
	104	68	Alphanumeric Data String (ASCII String)	y	79	01111001
	105	69	Manufacturer P/N(If<13 char--> 0Ah, then terminate with ASC II code 0Ah,set remaining char = 20h)		0A	00001010
	106	6A	Manufacturer P/N(If<13 char--> 0Ah, then terminate with ASC II code 0Ah,set remaining char = 20h)		20	00100000
	107	6B	Manufacturer P/N(If<13 char--> 0Ah, then terminate with ASC II code 0Ah,set remaining char = 20h)		20	00100000

APPENDIX A. Enhanced Extended Display Identification Data (EEDID™) 3/3

	Byte (Dec)	Byte (Hex)	Field Name and Comments		Value (Hex)	Value (Bin)
Timing Descriptor #4	108	6C	Flag		00	00000000
	109	6D	Flag		00	00000000
	110	6E	Flag		00	00000000
	111	6F	Data Type Tag (Alphanumeric Data String (ASCII String))		FE	11111110
	112	70	Flag		00	00000000
	113	71	Alphanumeric Data String (ASCII String)	L	4C	01001100
	114	72	Alphanumeric Data String (ASCII String)	P	50	01010000
	115	73	Alphanumeric Data String (ASCII String)	1	31	00110001
	116	74	Alphanumeric Data String (ASCII String)	1	31	00110001
	117	75	Alphanumeric Data String (ASCII String)	6	36	00110110
	118	76	Alphanumeric Data String (ASCII String)	W	57	01010111
	119	77	Alphanumeric Data String (ASCII String)	F	46	01000110
	120	78	Alphanumeric Data String (ASCII String)	1	31	00110001
	121	79	Alphanumeric Data String (ASCII String)	-	2D	00101101
	122	7A	Alphanumeric Data String (ASCII String)	S	53	01010011
	123	7B	Alphanumeric Data String (ASCII String)	P	50	01010000
	124	7C	Alphanumeric Data String (ASCII String)	A	41	01000001
	125	7D	Alphanumeric Data String (ASCII String)	1	31	00110001
Checksum	126	7E	Extension flag (# of optional 128 panel ID extension block to follow, Typ = 0)		00	00000000
	127	7F	Check Sum (The 1-byte sum of all 128 bytes in this panel ID block shall = 0)		5D	01011101